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Consultant Services Bulletin

News Bulletin No. 01-1, April 2001

**CONSULTANT NEWS BULLETIN 01-1**  
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## **English Units to Become Primary Working Unit of Measure for INDOT**

By a directive dated March 5<sup>th</sup>, 2001, Commissioner Cristine Klika and Chief Engineer Rick Smutzer have announced the change back to English units as the primary unit of measure for INDOT. The announcement states that: "Effective immediately all INDOT Specifications, Standards, Policies, etc. will refer to English units as the primary and show Metric in parentheses as the secondary. Thus, a dual unit system will be maintained with English units as the working measure."

What this means to INDOT designers is that all new projects should be started in English Units. Projects that have already been surveyed using metric units should be developed using metric units unless the survey can be converted and the project developed in English units at no additional cost to INDOT.

## **Consultant Services Section News**

Due to staff promotions etc., several changes have occurred recently within the Project Coordination Staff. The project coordination assignments for "State Projects" are as follows:

	Phone No's.	Route No's.
Sally Chesney	232-5339	1 – 31
Peggy Spears	232-5341	32 – 65
Hollie Bays	232-5199	66 – 912
Joan Staggs	232-0679	All Bridge Rehabilitation, Signing and Lighting Projects

## **Mitigation**

With respect to projects let after October 1, 2001\*, the plans, standard specifications, and/or special provisions must contain all mitigation measures listed in the environmental document (categorical exclusion, environmental assessment, or environmental impact statement), unless one of the following conditions is met:

1. The condition is listed in the "optional" section of the environmental document (Unless the environmental document contains two subsections (required and optional), all mitigation measures listed must be treated as required. Environmental documents prepared before October 1, 2001, will not have an "optional" subsection.) or
2. The designer requests and receives written approval to omit one or more of the conditions. Such requests (including the rationale for deletion or modification of a condition) shall be sent to the Environmental Assessment Section Manager (Mr. Juricic); a copy of the request shall be sent to the appropriate design project coordinator. The Environmental Assessment Section Manager will notify the designer whether it is acceptable to pursue deletion of a condition with the appropriate regulatory agency. The designer may not delete a condition until written approval is received from the appropriate regulatory agency (agencies).

\* Designers with projects on the October 2001, November 2001, and December 2001 lettings will receive a letter for each of their projects requesting them to review the environmental document and respond whether or not they desire to omit any mitigation conditions.

An example of a mitigation condition contained in numerous environmental documents that might be considered for deletion is the fish spawning restriction (no in-channel work between April 1 and June 30), especially if it is an intermittent stream (dry most of the time).

If a project has not received design approval and the designer believes that one or more of the project mitigation conditions listed in the environmental document should be omitted, the designer shall follow the procedure in item 2 above and write the Fish and Wildlife Review and Mitigation Section of the Design Summary accordingly, based upon the written response from the Environmental Assessment Section and the appropriate regulatory agency (agencies). The designer shall attach to the Fish and Wildlife Review, the letter(s) from the appropriate regulatory agency (agencies) approving deletion or modification of a mitigation condition.

In the future, environmental documents will contain a section with a summary of mitigation measures. There will be two subsections (required and optional).

This article supercedes the guidance given on page 5 in Consultant Newsletter 00-2, dated October 2000. The following guidance from Consultant Newsletter 99-1 is reinstated:

If INDOT committed to the fish spawning restriction in the Fish and Wildlife Review and such restriction is not contained in any of the permits to be included in the contract documents, the Designer must prepare a unique special provision and include it in the special provisions attachments.

### **Guidance on Reducing the Usage of 2:1 Slopes**

Designers should avoid using 2:1 slopes on INDOT projects unless they are absolutely necessary. 2:1 slopes are extremely difficult to maintain, are susceptible to erosion problems, and in some soil types they have serious slope stability problems. The use of 2:1 slopes on LPA projects will continue to be at the discretion of the local public agency.

The intent of this policy clarification is to greatly reduce the number of locations where 2:1 slopes are proposed by designers. The acceptability of using steeper than desirable sideslopes differs depending on the project design criteria:

#### **1.) New Construction/Reconstruction Projects (4R)**

On 4R projects with right-of-way taking the use of 2:1 slopes should be avoided whenever possible. Even in deep cuts or high fills the additional right-of way cost to construct 3:1 slopes beyond clear zone is generally a minor consideration. If 2:1 slopes appear to be

necessary at select locations, early geotechnical investigation should be conducted to determine their suitability.

In urban areas with limited or very costly right-of-way, 2:1 slopes may be permissible. Alternatives such as burying pipes in the ditches to reduce the slopes or constructing mechanically steepened slopes should be evaluated if these practices will result in better slope stability. Another alternative is described in Section 36-6.08 which recommends the use of curbs along the shoulder under the guardrail at the top of steep slopes with high erosion potential. Details of this practice are shown on Standard Drawing 601-WBGA- 02.

On some 4R interstate rehabilitation projects it may not be feasible to upgrade all slopes to provide the required clear zone due to environmental constraints or right-of-way limitations. If slopes steeper than 3:1 are retained, they shall be evaluated to determine if guardrail is warranted using the figures in Section 49-4.04. Slopes may also be evaluated using the AASHTO "ROADSIDE" software contained in the AASHTO Roadside Design Guide. See Section 54-4.0.

Designers must prepare Level Two Documentation whenever 2:1 sideslopes are proposed on 4R projects. This should be completed at the grade review stage or the first submission after the date of this newsletter. The documentation must include a discussion of the economic and/or environmental reasons for needing steep sideslopes.

## 2.) 3R Projects

According to Section 55-4.05(10)2a the use of 3:1 slopes should be considered for most 3R projects. If steeper slopes are required on a 3R project, 2.5:1 slopes should be considered before implementing 2:1 slopes. Slopes behind guardrail at the corners of bridges should not be routinely steepened to 2:1 even though the slope may be completely protected by the guardrail.

Locations and situations that may warrant 2:1 slopes are as follows:

1. Roadway widening that encroaches into a wetlands.
2. Areas with restrictive right-of-way or very costly right-of-way.
3. Slopes at ends of large culverts, bridge spillslopes, or other locations where it is desirable to protect the slopes with riprap.

Whenever 2:1 slopes are specified they shall be protected with erosion control blankets and capping soils suitable for growing vegetation shall be provided. Designers should contact the INDOT Landscape Architect, concerning the possible inclusion of recurring special provision 621-R-398 which describes capping cut and fill slopes steeper than 3:1. See Appendix "A" for a copy of the special provision.

## **Empirical Design of Decks**

Effective for contracts let after July 1, 2001 the designer may use empirical design (Section 9.7.2 of the AASHTO LRFD Bridge Design Specifications, 2<sup>nd</sup> Edition) to design decks (supported on beams or girders) if the following conditions, in addition to those in 9.7.2.4, are met:

1. The design year AADT is less than 5,000.
2. The skew is less than or equal to 20°.
3. The design year ADTT (average daily truck traffic) is less than 500.

This applies to both bridge rehabilitation projects (which include new decks) and new bridges. Empirical design of the deck may be used even though the remainder of the structure is designed using Load Factor.

It is noted that the coping overhangs must be designed using LRFD in accordance with the provisions of 9.7.2.2. For continuous structures, the designer shall design the negative moment steel in the deck using the Load Factor method.

The LRFD Specifications requires four layers of isotropic reinforcement. For each of the two top layers, the minimum steel area is  $380 \text{ mm}^2/\text{m}$ . For each of the bottom two layers, the minimum steel area is  $570 \text{ mm}^2/\text{m}$ . For constructability purposes INDOT recommends using #16s @ 450mm in the two top layers and #16s @ 300mm in the two bottom layers.

All contracts let after July 1, 2001 shall contain the recurring special provision (109-B-148) contained in Appendix "B" until it becomes a recurring special provision or standard specification.

If the designer uses empirical design for the deck please send a letter or memo to Mr. John E. Jordan at INDOT (100 N. Senate Avenue, Room N642, Indianapolis, IN 46204) so that a database can be kept of such bridges.

Contractors will not be allowed to submit a cost reduction incentive proposal to redesign decks designed using AASHTO Standard Specifications for Highway Bridges, 16<sup>th</sup> Edition.

## **Vertical Clearance Over Railroad**

In spite of anything to the contrary in the Design Manual, vertical clearance over a railroad is a level one item.

## **Bridges on Extra Heavy Duty Highways**

The following list of extra heavy duty highways supercedes the list published in Consultant Newsletter No. 98-1 at page 5:

- (1) Highway 41, from 129<sup>th</sup> Street in Hammond to Highway 312.
- (2) Highway 312, from Highway 41 to Highway 12.
- (3) Highway 912, from Michigan Avenue in East Chicago to Highway 12.
- (4) Highway 12, from Highway 912 to Clark Road in Gary.
- (5) Highway 20, from Clark Road in Gary to Highway 39.
- (6) Highway 12, from one-fourth ( $\frac{1}{4}$ ) miles west of the Midwest Steel entrance to Highway 249.
- (7) Highway 249, from Highway 12 to Highway 20.
- (8) Highway 12, from one and one-half ( $1\frac{1}{2}$ ) miles east of the Bethlehem Steel entrance to Highway 149.
- (9) Highway 149, from Highway 12 to a thirty-six one-hundredths (.36) of a mile south of Highway 20.
- (10) Highway 39, from Highway 20 to the Michigan state line.
- (11) Highway 20, from Highway 39 to Highway 2.
- (12) Highway 2, from Highway 20 to Highway 31.
- (13) Highway 31, from the Michigan state line to Highway 23.
- (14) Highway 23, from Highway 31 to Olive Street in South Bend.
- (15) Highway 35, from South Motts Parkway thirty-four hundredths (.34) of a mile southeast to the point where Highway 35 intersects with the overpass for Highway 20/Highway 212.
- (16) State Road 249 from U.S. 12 to the point where State Road 249 intersects with Nelson Drive at the Port of Indiana.
- (17) State Road 912 from the 15<sup>th</sup> Avenue and 169<sup>th</sup> Street interchange one and six hundredths (1.06) miles north to the U.S. 20 interchange.
- (18) U.S. 20 from the State Road 912 interchange three and seventeen hundredths (3.17) miles east to U.S. 12.

All bridges on these segments of road must be designed for “Michigan Train” loadings shown in Appendix “C” of Consultant Newsletter No. 98-1.



## **Bridge Approach Slab and Pavement Ledge Details**

Revisions to 610-RCBA-01 and 610-RCBA-02 were approved during August 2000 by the Standard Specification Committee. By accident they were omitted from the September 2001 distribution of Standard Drawings. Therefore, the changes are being implemented by recurring special provisions 610-B-144d pages 1 and 2 or E 610-B-144d pages 1 and 2. The changes are:

1. The thickness of the approach slab will depend on the traffic count (250mm if  $AADT < 1000$  or 300mm if  $AADT \geq 1000$ ) if the approach pavement is all asphalt. See 610-B-144d page 1.
2. The thickness of the approach slab will be 300mm or the thickness of the concrete pavement adjacent to the approach slab. See 610-B-144d page 2.
3. The 45° taper of the approach slab thickness has been moved 450mm from the pavement ledge.

See Appendix "C" for the revised bridge approach slab details and for the revised pavement ledge detail which replaces the one published in Appendix "A" of Consultant Newsletter 00-1, dated February 2000.

## **Curing of Concrete Bridge Decks and Reinforced Concrete Slabs**

At its March, 2001 meeting, the Standard Specifications Committee approved a revision to the standard specifications regarding curing of concrete bridge decks and reinforced concrete slabs. The curing period will now be 7 days. In order to implement the new curing period, the designer must include all of the following recurring special provisions:

702-B-149  
702-B-150  
702-B-151

These recurring special provisions are included in Appendix "D".

## **Intermediate Diaphragms for Prestressed Concrete I-beams and Bulb Tees**

Effective immediately, designers may use the following criteria for intermediate diaphragms for prestressed concrete I-beams and bulb tees:

1. For spans greater than 25 m but less than or equal to 40 m provide diaphragms at the mid-span.
2. For spans greater than 40 m provide diaphragms at the third points.

## **Bridge Replacement Special Provisions Checklist**

An updated list of typical recurring special provisions for bridge replacement projects is included in Appendix "E".

## Revised Guidelines for Foundation Reviews

In consultant news bulletin 00-2 we updated the Guidelines for Foundation Reviews. The guidelines are revised as follows:

- a. Delete items 2 and 3
- b. Insert new item 2 to read as follows:

For pile footings the minimum pile tip elevation shall be determined using the Q500 scour elevation.

- c. Renumber the remaining items.

In consultant news bulletin 00-1 (Appendix “E”) we published the chart for determining pile tip elevations for structures over bodies of water. The chart is revised as follows:

- a. The first sentence of note 3 is revised to read as follows:

The top of footing shall be below contraction scour for Q100.

- b. Ⓐ is revised to read as follows:

Minimum pile tip elevation to be 3.0m below total scour depth for Q500.

The revised guidelines with Pile Tip Elevation Chart may be found at [www.ai.org/dot/design/consult.htm](http://www.ai.org/dot/design/consult.htm).

## Tangent Runout Length for Multilane Highways

Delete equation 43-3.4 on page 43-3(19) and insert

$$\text{TR} = \frac{(\text{S normal})(L)}{(e)(n) - (\text{S normal})(n-1)} \quad (\text{Equation 43-3.4})$$

Add:

n = number of lanes being rotated

This equation is valid for n=2 and n=3; it has not been checked for other n's.

## Prestressed Concrete I-Beam Selection Charts

Prestressed Concrete I-Beam selection charts for predicting maximum span lengths of AASHTO sections 1 through 4, the Illinois Type 4 section and standard Indiana Bulb Tee sections using AASHTO LRFD code provisions are included in Appendix "F". These charts were developed for incorporation into the future INDOT Bridge Design Manual.

## **Future Wearing Surface**

There is some confusion regarding the number to use for the dead load of future wearing surface. Prior to the publication of the Plan Metrication Guidelines during July, 1993 the value was 35 psf. The Plan Metrication Guidelines established the value as  $1.2 \text{ kN/m}^2$  (25 psf). Henceforth, designers shall design for  $1.7 \text{ kN/m}^2$  (35 psf) of future wearing surface.

## **BS Expansion Joint**

Effective for projects let after October 1, 2001 do not use a BS expansion joint as an expansion joint in bridge decks. Such joints do not comply with 14.5.3.3 of the 2<sup>nd</sup> Edition of the AASHTO LRFD Code.

## **Corrugations in HMA Shoulders**

At its March, 2001 meeting, the Standard Specification Committee eliminated rolled corrugations in HMA shoulders. Therefore, if corrugations are required in HMA shoulders they must be milled and the appropriate pay item included in the contract.

Include recurring special provision 401-R-399 if the shoulder material is QC/QA; otherwise include 402-R-400. See Appendix "G" for a copy of these special provisions.

## **Additional Subbase Width for PCCP**

Effective with the release of Design Memorandum No. 00-09 all portland cement concrete pavement (PCCP) is to have additional subbase beyond the edge of the concrete pavement. The example typical cross sections showing this extra subbase (Figure 52-6F through Figure 52-6H) were incorporated into the Design Manual as of the July 2000 revisions. The extra width of subbase is for the paving machine tracks (i.e. wheels) to run on during the paving operation. Please update all PCCP typical cross sections to include the required additional subbase.

## **Geogrid for Subgrade Stabilization or Modification**

When geogrid for subgrade stabilization or modification is called for in the geotechnical report, the designer shall include recurring special provision 913-R-403 and include the appropriate pay item and quantity in the estimate. See Appendix "H" for a copy of this special provision.

## **Paved Shoulder in Front of Guardrail**

Contrary to 49.5.01 (02) always pave the outside shoulder to the face of the guardrail when the guardrail is located 3.6 meters or less from the edge of travel lane.

With respect to the inside shoulder follow the standard drawing for an MS guardrail end treatment.

## Asphalt Widening at Bridge Approaches on Divided Highways

When the inside shoulder of a divided highway (Interstate, U.S. Route, or State Route) is widened to accommodate shifting traffic (2 lanes merged into the inside lane), the designer should follow the provisions in 49-5.01 (02) regarding whether to pave to face of guardrail.

### Temporary Guardrail

82-4.02 (01) states “temporary guardrail installations must meet the permanent installation criteria in Chapter Forty-nine and the INDOT Standard Drawings, except as modified in Section 82-4.04.” 82-4.04 does not exist. The reference should be to Figure 82-4B, which contains the clear zone distances during construction. Designers should follow this criteria for interstate projects.

With respect to non-interstate temporary runarounds, the following guidelines should be used to determine the temporary guardrail length on all 4 corners:

	<u>Minimum Length</u>
$V \leq 80 \text{ Km/h}$	15.24m (50')
$V > 80 \text{ Km/h}$	30.48m (100')

Where  $V$  = design speed in the construction work zone.

Temporary guardrail shall continue until the guardrail warrants for embankments as found in Section 49-4.04 of the Design Manual are satisfied. (The design speed, not the construction zone speed, should be used to determine if temporary guardrail is warranted.)

### Railroad Crossings

All railroad crossings, regardless if a 3R or 4R project, must meet the following design criteria:

1. The approach elevation must be the same elevation as the top of rails for a distance of 0.6m outside the rails.
2. The surface of the highway should also not be more than 75mm higher or 150mm lower than the top of nearest rail at a point 9m from the rail unless track superelevation dictates otherwise.

See page 794 of the 1994 AASHTO Green Book.

### Intersection Sight Distance

Recently, we have received plan and profile sheets to support the conclusion that the required intersection sight distance is provided. The sight line is shown in the plan and profile views; generally, this information has been shown correctly. The proposed profile grade line along centerline is shown; this is meaningless for this analysis. The proposed ground line under the sight line is the relevant one.

## **Open Graded Asphalt Layers**

Do not use QC/QA material for open graded asphalt layers regardless if any of the other pavement layers are QC/QA material.

## **Public Information Meeting/Ramp Closure**

In Consultant Newsletter 95-2 INDOT announced its policy of requiring public information meetings if an interstate ramp will be closed. That policy was included in 14-2.02 (02) when it was published. Consultant Newsletter 99-1 (see page 4) modified 14-2.02 (02); however, 14-2.02 is limited to interstate projects.

INDOT desires to also do public information meetings for all ramp closures (Interstate, U.S. Route, or State Route) of 7 days or more. The procedure for such meetings shall be in accordance with 14-2.02 (02) as stated in Newsletter 99-1.

## **Scope / Environmental Compliance Form**

The Scope / Environmental Compliance Form has been updated to incorporate the Corps RGP. Please begin using the new form immediately. The new form may be found at [www.ai.org/dot/design/consult.htm](http://www.ai.org/dot/design/consult.htm).

## **Level One Design Criteria Checklist**

The Level One Design Criteria Checklist has been revised. Please begin using the new form immediately. The new form may be found at [www.ai.org/dot/design/consult.htm](http://www.ai.org/dot/design/consult.htm).

## **Contract Proposal Book Certification**

The following supercedes item 4 on page 16 of consultant newsletter 00-1:

Within one week after receipt, the designer shall review the plans and proposal book for each contract for which the designer is signing and sealing some or all of the plan sheets. The designer shall complete the Contract Proposal Book Certification form (See [www.ai.org/dot/design/consult.htm](http://www.ai.org/dot/design/consult.htm) for revised form.) and send the original to the appropriate District Construction Engineer with copies to the Contracts Sections and Design Project Coordinator. If errors are noted the designer shall also contact the appropriate District Construction Engineer to determine how the errors should be handled (revision before open bids, construction change after bids opened, etc.); this determination shall be documented in a memo to the appropriate District Construction Engineer with copies to the Contracts Section and Design Project Coordinator.

## Design Exceptions

For level 1 and level 2 design exceptions the designer must sign and date the request. Consultants must also include the name of the consulting firm below their name.

## Signatory for Indianapolis DCAM Design Exceptions

Since October, 1995 it has been a requirement that all design exception requests for roads under an LPA's jurisdiction must be signed by the local elected public officials who have jurisdiction over the road. In large metropolitan areas, high level appointed officials may sign for the elected official.

For Indianapolis DCAM the responsible appointed official is the Director of the Department of Capital Asset Management. The responsibility for signing design exceptions has been delegated to the Assistant Administrator for Asset Management (currently Jarod Klaas).

## FHWA Involvement

The following figure is a simplification of Figure 40-7A, which was revised during July 2000.

Project Category	HIGHWAY SYSTEM	
	Interstate	Non-Interstate
New Construction, Reconstruction, or Partial Reconstruction (4R) > \$1,000,000	FHWA Oversight	Exempt From FHWA Oversight
New Construction Or Reconstruction (4R) < \$1,000,000	Exempt From FHWA Oversight	Exempt From FHWA Oversight
3R Projects	Exempt From FHWA Oversight	Exempt From FHWA Oversight

Note: Although this figure provides general guidelines for determining FHWA involvement on projects, there may be exceptions such as projects with special structure designs, experimental features, warranty work, Intelligent Transportation Systems (ITS) features, Design-Build projects, etc., which would make it desirable to have FHWA oversight. The oversight determination for these special feature projects will be made at the meeting discussed in Section 40-6.02(03), Item 3.

## **Structure Numbers for Culvert-like Bridges**

All three-sided culverts, oversize box culverts, multiple box culverts, and multiple pipe structures qualify as bridges if their total span length is 6.1m or greater. Large culverts having opening widths less than 6.1m also qualify as bridges when their skew causes the span measured along the centerline of the roadway to be 6.1m or greater. Please obtain a structure number and Des. number for these culverts and show these numbers on the plans so the structures may be properly inventoried as bridges.

### **Practice Pointers**

1. On LPA bridge projects it is not necessary to submit a Plat No. 1 to the Design Division, regardless of what the Design Manual says in Chapter 14 for various submissions.
2. Do not show PG binder in the plans for non QC/QA pavement.
3. With respect to item 3 in the article on Prestressed Concrete Design in Consultant News Bulletin No. 00-2, it is acceptable to drape strands in a prestressed concrete bulb-tee beam if a beam line can be eliminated.
4. Intersections on roads with ESALs > 3,000,000 shall use QC/QA mixtures regardless of the quantity and shall specify a PG binder of 76-22. See 52-1.02 (05).
5. An Earthwork Balance table is required for road projects. An Earthwork Tabulation is required for bridge projects. See 17-2.05.
6. On embankments, benching is used to stabilize fill on existing slopes steeper than 4:1. Benching should be shown on cross – sections. See 18-2.08 (03). The quantity for benching should be included in the Earthwork Balance for road projects or Earthwork Tabulation for bridge projects. See 17-2.05.
7. Intersection sight distance is a level two criterion. See 40-8.02 (02) item 5. Driveway sight distance is a separate design element. See 46-11.01 (03). Driveway sight distance is a level three item.
8. The “No Passing” pavement markings should be extended to the end of the no passing zone, regardless if it is inside or outside the project limits.
9. On LPA projects county roads and city streets do not have reference points (RPs).
10. At page 8 and Appendix C of Consultant Newsletter 00-1, dated February 2000, INDOT established criteria for installation of guardrail for large culverts on 4R projects constructed on new alignment. The sketch in Appendix C of that Newsletter is now part of a recurring special provision (601-R-386d 7). Do not pave to the face of this guardrail. Just construct the regular width of stabilized shoulder.

11. Pursuant to 18-1.05 a geotech summary report is to be included in the contract proposal documents. Please add a line on the recurring special provisions menu for it and check the box to show there is an attachment.
12. The designer and reviewer must initial and date computations, including computer print-outs.
13. When consultants submit full size plans to the INDOT Project Coordinators for distribution, the plans must be clearly labeled on the outside of the roll. The Project Coordinators do not have time to unroll each set of plans or tracings to determine if they are road plans or signing and lighting plans, which should be directed to the Specialty Projects Section.
14. When tracings are turned in the Contract Number is to be shown on every sheet. Failure to show the contract number on every sheet will result in a substandard evaluation score for procedure compliance.

### **New Policy for Design Division Records Unit Document Requests**

In accordance with the direction of the INDOT Legal Division, effective immediately, all Records Unit document requests from the public must be submitted in writing. Written documents may be:

1. Faxed to (317)233-4929
2. Sent via email from the online request form under Design Division at [www.state.in.us/dot/info.htm](http://www.state.in.us/dot/info.htm).
3. Sent by regular mail to: INDOT  
Division of Design, Records Unit  
IGCN, Room 642  
100 North Senate Avenue  
Indianapolis, IN 46204-2219

A copy of a document request form for fax, mail and walk-in is available in Appendix "I".

### **Bridge Search Data Form**

A revised Bridge Search data form is available in the downloadable form list at [www.ai.org/dot/design/consult.htm](http://www.ai.org/dot/design/consult.htm). This form is to be submitted along with tracings for all bridge projects.

### **Overhead Rates**

Consultants with active INDOT contracts are expected to submit overhead rate documentation to the INDOT Contract Audit Unit within 90 days of the end of each company's fiscal year. Failure to submit overhead rate documentation within a reasonable time period could affect future selection.



## CAPPING CUT AND FILL SLOPES STEEPER THAN 3:1

**Description.** This work shall consist of:

1. covering soil slopes with a cohesive soil to establish vegetation;
2. use of soil reinforcement materials and blankets for mulching seed as shown on the plans and in accordance with these requirements;
3. use of water absorption chemicals to hold water and keep moisture available for seed germination; and
4. soil testing for pH, nutrient supply, and organic matter percentage.

**Materials.** The materials shall be in accordance with the following:

1. Mulch blankets. The mulch blankets shall be excelsior blankets or straw mats in accordance with 621.05(d) or 621.05(f).
2. Water absorption gels. Water absorption gels developed for horticultural use shall be incorporated into the top 30 mm (1 ½ in.) of the capping soil according to the manufacturer's recommendations. The Contractor shall supply a copy of the manufacturer's recommendation to the Engineer prior to the placement of the capping soil.
3. Capping soil. The capping soil shall be a type A4, A5, A6, or A7 AASHTO classification, that has a pH range of 6 to 7 and an organic content of 5 to 10% by volume or 2 to 3% by dry weight. The soil shall be tested by an approved laboratory and the results shall be furnished to the Engineer prior to the placement of the soil.

**Construction Requirements.** All slopes steeper than 3:1 designated for seeding shall be ripped to a depth of 50 mm (2 in.) and then covered with a 150 mm (6 in.) layer of capping soil. The capping soil shall be evenly spread over all areas and shall have the water absorption gels incorporated. The capping soil shall be tracked into place such that the cap adheres to the existing soil and forms the desired contours for the slope. All debris in the capping soil shall be in accordance with 203.09. All areas shall be fine graded to produce a smooth surface which conforms to the contours and cross sections desired.

**Method of Measurement.** Existing soils stripped and stockpiled for use as a capping soil will be measured as common excavation in accordance with 203.27. Capping soil obtained from off the right-of-way will be measured as borrow in accordance with 203.27. Erosion control blankets will be measured in accordance with 621.12. Water absorption gels will not be measured for payment.

**Basis of Payment.** Existing soils stripped, stockpiled, and then redistributed as a capping soil will be paid for as common excavation in accordance with 203.28. Capping soil obtained from off the right-of-way will be paid for as borrow in accordance with 203.28. Erosion control blankets will be paid for in accordance with 621.13.

The cost of the water absorption gel shall be included in the cost of the erosion control blanket.

COST REDUCTION INCENTIVE

The Standard Specifications are revised as follows:

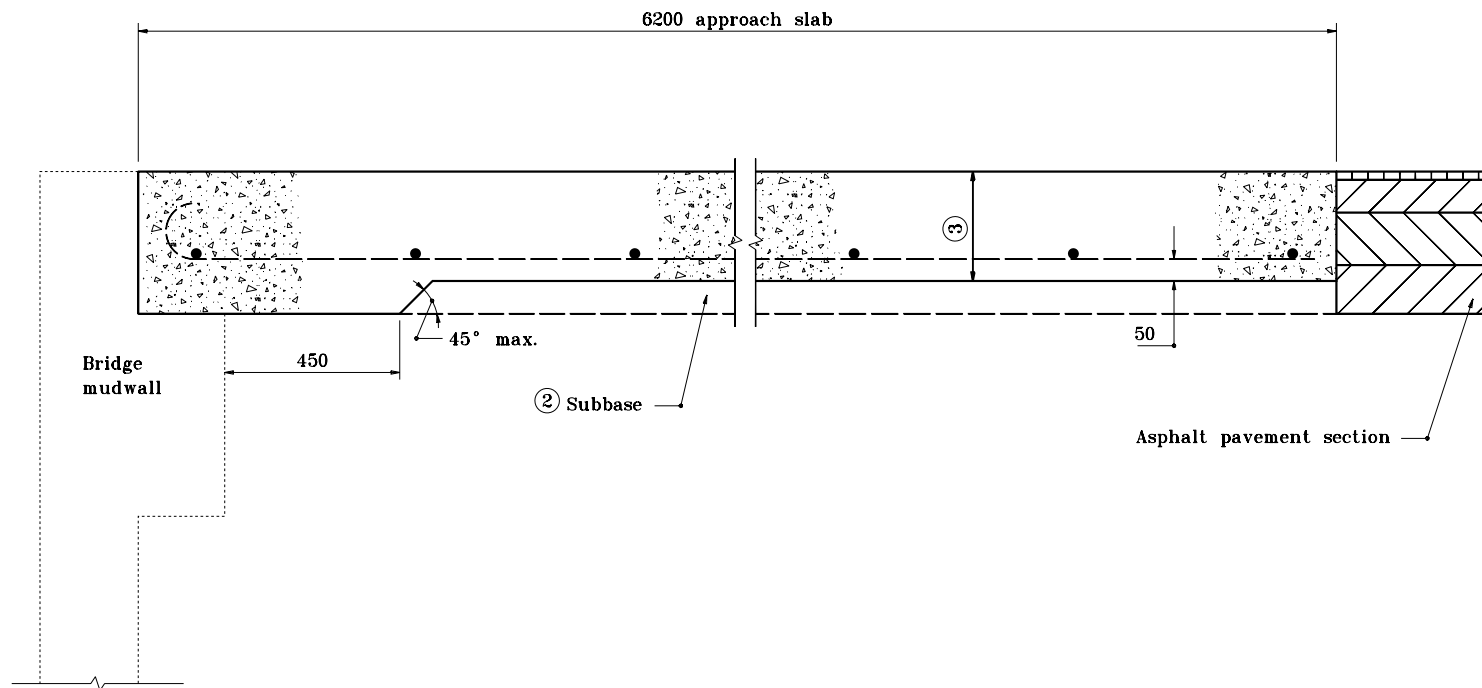
SECTION 109, AFTER LINE 320, INSERT AS FOLLOWS:

*A proposal which uses empirical design (Section 9.7.2 of the AASHTO LRFD Bridge Design Specifications, 2<sup>nd</sup> Edition) of the concrete bridge deck will not be considered or approved.*

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# **NOTES**

1. See Standard Drawing 610-RCBA-04 for reinforcement details.
- ② Subbase for PCCP shall only be used when underdrains are specified or existing.
- ③ 250 if design year AADT < 1000  
300 if design year AADT ≥ 1000



All dimensions are in mm unless otherwise specified.

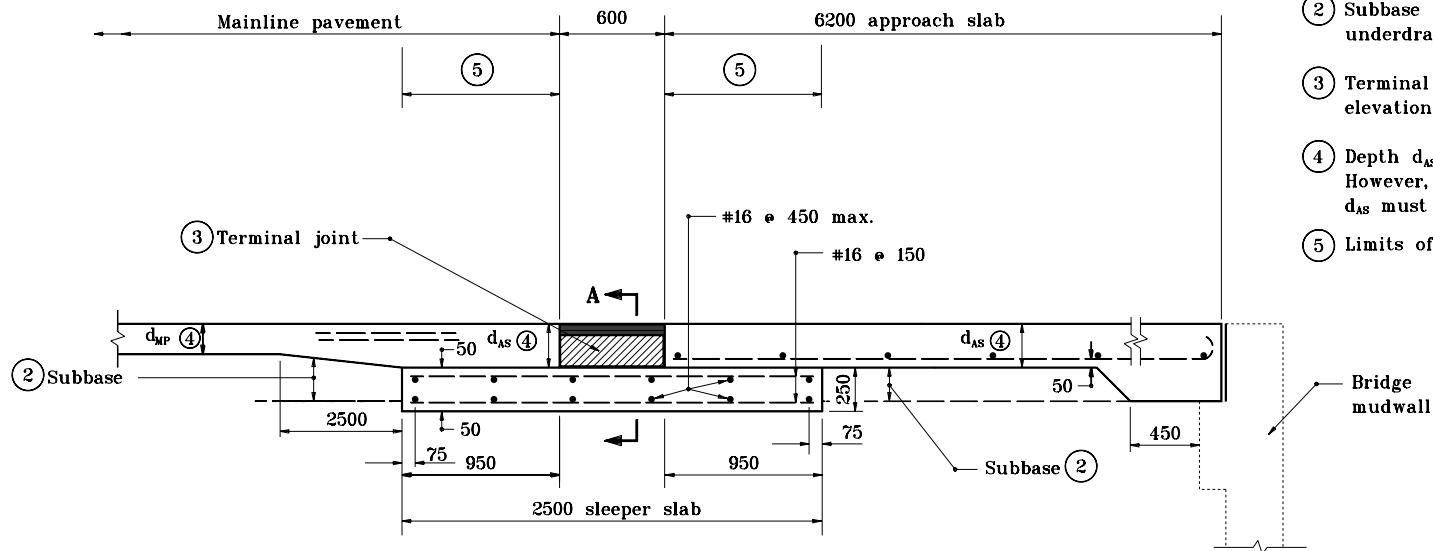
INDIANA DEPARTMENT OF TRANSPORTATION

**BRIDGE APPROACH SLAB  
FOR USE WITH ASPHALT PVMT.**

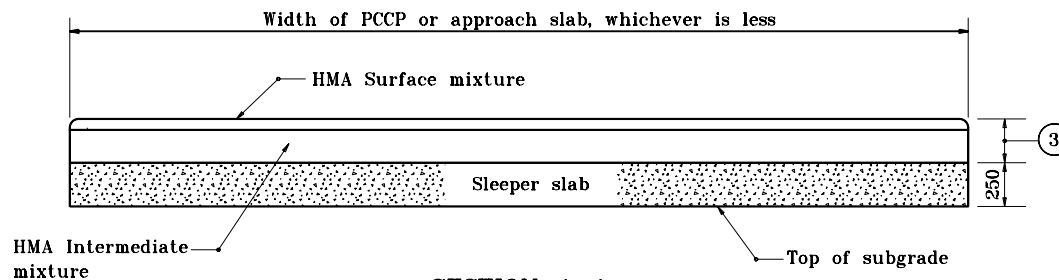
2-6-01

## GENERAL NOTES

1. See Standard Drawing 610-RCBA-04 for reinforcement details.
- ② Subbase for PCCP shall only be used when underdrains are specified or existing.
- ③ Terminal joint elevation shall match elevation of adjacent panels.
- ④ Depth  $d_{AS}$  must equal  $d_{MP}$ . However, if  $d_{MP}$  is less than 300,  $d_{AS}$  must be 300.
- ⑤ Limits of polyethylene bond breaker.



## TERMINAL JOINT FOR REINFORCED PCCP AT BRIDGE STRUCTURE



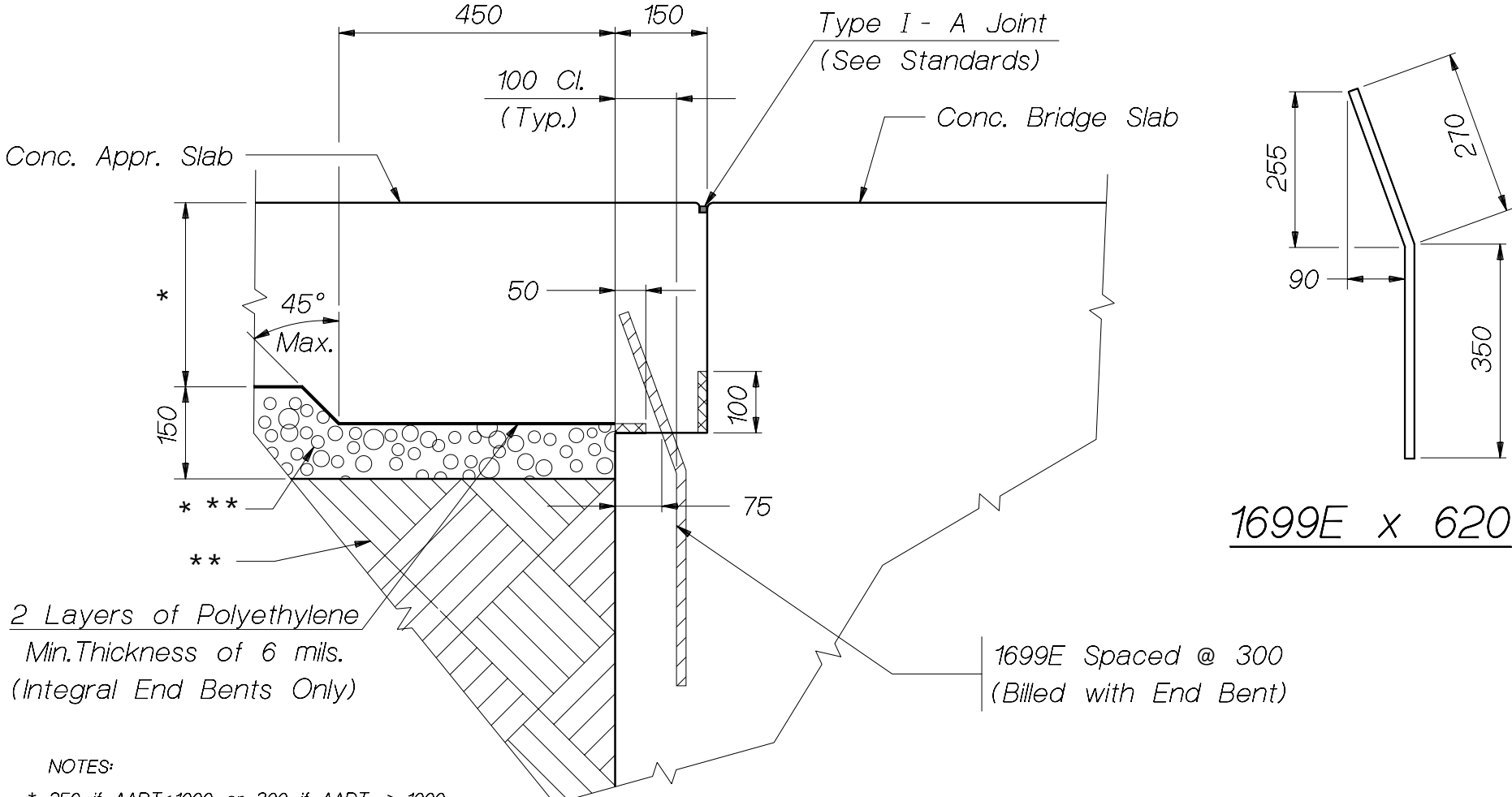
### SECTION A-A

All dimensions are in mm unless otherwise specified.

INDIANA DEPARTMENT OF TRANSPORTATION

**BRIDGE APPROACH SLAB  
AND TERMINAL JOINT**

2-6-01



NOTES:

- \* 250 if AADT < 1000 or 300 if AADT ≥ 1000  
or match thickness of concrete approach  
pavement (if thicker than 300)
- \*\* Flowable mortar if slab bridge or  
Coarse Aggregate #8 or #9 for all other bridges with end bents
- \*\*\* Comp. Aggr. Base Type "O" if no underdrains or  
Subbase for cement conc. pavement if underdrains are specified or existing

 13 mm Expanded Polystyrene

NOTE: All Dimensions are in mm

# PAVEMENT LEDGE DETAIL

Scale: 1:10

## CURING COLD WEATHER CONCRETE

The Standard Specifications are revised as follows:

SECTION 702, BEGIN LINE 495, INSERT AS FOLLOWS:

Immediately after a pour is completed, the freshly poured concrete and forms shall be covered so as to form a protective enclosure and the air in the enclosure kept at a temperature above 10°C (50°F) for at least *144 h for bridge decks, the top surface of reinforced concrete slab bridges, and for at least 72 h for all other concrete*. If for any reason this temperature is not maintained, the heating period shall be extended. When dry heat is used, means shall be provided to maintain adequate moisture in the air within the enclosure.

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702-B-149

## TEST BEAMS

The Standard Specifications are revised as follows:

SECTION 702, BEGIN LINE 711, DELETE AND INSERT AS FOLLOWS:

**(g) (h) Test Beams.** When it is to the advantage of the Department or Contractor, when portland-pozzolan cement, type IP or IP-A, is incorporated into the structural concrete *elements listed below*, when fly ash or ground granulated blast furnace slag is incorporated into the structural concrete *elements listed below*, or when field operations are being controlled by beam tests, the removal of forms, supports, and housings, and the discontinuance of heating and curing may be permitted when the modulus of rupture reaches or exceeds the following values:

Concrete Used in	Required Flexural Strength, kPa (psi), Dead Load Only
<del>Floor Slabs on steel structures and similar units</del> .....	<del>2070 (300)</del>
Girders, Arches, and similar units.....	2690 (390)
<del>Floors between concrete girders</del> .....	<del>2070 (300)</del>
<del>Precast Concrete Piles</del> .....	<del>3650 (530)</del>
Interior Bent or Pier Caps.....	3310 (480)

The beams ~~shall~~ *will* be cured under the same conditions as the concrete which they represent. Beams ~~shall~~ *will* be tested *for flexural strength* as simple beams with third point loading in accordance with ~~AASHTO T 97 as modified in 501.03(a)~~ 505.

---

## CURING CONCRETE

The Standard Specifications are revised as follows:

SECTION 702, BEGIN LINE 1131, DELETE AND INSERT AS FOLLOWS:

**702.22 Curing Concrete.** *Concrete in bridge decks or the top surface of reinforced concrete slab bridges shall be cured continuously for at least 168 h commencing immediately after initial set. If pozzolans in excess of 10 percent, by mass, of the portland cement are used in the mix, the surface shall be cured continuously for 240 h.*

Unless otherwise specified or permitted, *all other* concrete shall be cured for at least 96 h commencing immediately after initial set. If portland-pozzolan cement, type IP or IP-A, or fly ash is used, the concrete shall be cured for at least 120 h commencing immediately after initial set.

Membrane forming curing compound may be used in lieu of protective covering curing methods. Where it has been determined that a surface treatment or class 2 finish is to be used, the membrane forming curing compound shall not be used.

The curing of surfaces to be waterproofed may be discontinued when waterproofing is started.

If field operations are controlled by beam tests, *the* curing time, *except for bridge decks and the top surface of reinforced concrete slab bridges*, shall be in accordance with 702.13~~(g)~~(h).

If further precautions are necessary to ensure strength, they shall be taken as directed.

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**Every bridge replacement project will have the following:**

- |              |   |           |           |
|--------------|---|-----------|-----------|
| 105-C-056    | 106-C-074   | 106-R-276 | 621-R-283 |
| • 100-C-146  | Min. Wage (Lake, LaPorte, Porter and St. Joseph County) <u>OR</u> |           |           |
| • 100-C-147  | Min. Wage (Elsewhere)   |           |           |
| • 104-C-139  | Geotechnical Evaluation Report                                    |           |           |
| • 107-C-051  | U.S. Army Corps of Engineers Permit                               |           |           |
| • 107-R-169  | Existing Conditions of Additional R/W, Utilities, etc.            |           |           |
| • 109-B-148  | Cost Reduction Incentive  |           |           |
| • 206-B-113  | General Bridge Requirements (If Design Approval after 3-1-94)     |           |           |
| • 211-R-357  | B-Borrow and B-Borrow for Structure Backfill                      |           |           |
| • 500-R-383  | PCCP (Do not use for Culverts)                                    |           |           |
| • 601-R-338  | Guardrail Blockouts   |           |           |
| • 610-B-144d | Bridge Approach Slab (include page 1 or page 2)                   |           |           |
| • 702-B-149  | Curing Cold Weather Concrete                                      |           |           |
| • 702-B-150  | Test Beams  |           |           |
| • 702-B-151  | Curing Concrete   |           |           |
| • 715-R-361  | Pipe Material Abbreviations                                       |           |           |

**Many bridge replacement projects will also require the following:**

- |              |   |
|--------------|---|
| • 105-R-305  | Pipe Structure Pay Items  |
| • 107-B-040  | Environmental Restrictions                                      |
| • 201-C-052  | Clearing R/W (Pay item: Clearing R/W)                           |
| • 203-R-360  | Embankments constructed of CCBP (Borrow > 3800 m <sup>3</sup> ) |
| • 701-B-101d | Pile Driving and Equipment Data Form                            |
| • 701-B-132  | Pile Driving  |
| • 707-B-013  | High Range Water Reducers in Prestressed Beams                  |
| • 715-R-341  | Pipe Material Selection (Pipes Referred to as Groups)           |
| • 715-R-342  | Pipe Backfill Methods (Pipes Referred to as Groups)             |
| • 718-R-326  | Underdrains (When old pipe groups are used)                     |
| • 718-R-326A | Underdrains (When new pipe stds. are used)                      |
| • 808-B-114  | "No Passing" Zone Repainting                                    |
| • 808-M-016  | Removal of Snowplowable RPM Markers                             |
| • 808-T-116  | Snowplowable RPM Markers  |
| • 903-T-120  | Reflective Lens for Snowplowable RPM                            |

**Other occasionally recurring bridge related special provisions:**

- |              |   |
|--------------|---|
| • 103-C-036  | Owners and Contractors Liability Insurance (LPA Contracts only) |
| • 103-C-139  | Wage Stipulations (Only on All State Funded Projects)           |
| • 107-R-042a | Railroad Information  |
| • 107-R-042b | Protection of Railway Interest                                  |
| • 203-B-025  | Marion County Borrow Pits                                       |
| • 203-R-155  | Rock Backfill   |

- 601-R-146 Removal of Guardrail (If Guardrail Requested by District)
- 622-R-209 Wildlife Habitat (Do Not Use if Shown on Plans)
- 701-B-068 Bitumen Coating for Piles
- 701-B-078 Oversized Predrilled Pile Holes for Integral End Bent Structures
- 703-C-138 Reinforcing Steel (Projects with Hard Metric Rebars)
- 713-B-076 Temporary Pipe (Pay Item: Temp. Pipe and Approaches)
- 720-R-173 Proof Load for Castings (Pay Item: Inlet, Catch Basin or Manhole)
- 723-R-282 Precast Reinforced Concrete 3-Sided Culvert **OR**
- 723-R-282 f Precast Reinforced Concrete 3-Sided Flat-Topped Culvert
- 724-B-086 Approved Expansion Joint SS Devices
- 726-B-044 Bearing Assemblies
- 728-B-039 Masonry Coating (Urban Projects)

**Road Special Provisions Occasionally Recurring in Bridge Projects:**

- 203-R-121 Borrow Pit Wetland Enhancement (If Requested by F&W)
- 215-R-189 Lightweight Engineered Fill
- 401-R-399 Shoulder Corrugations on QC/QA Projects
- 401-R-400 Shoulder Corrugations on non-QC/QA Projects
- 617-R-188b Geogrid
- 621-R-398 Capping Cut and Fill Slopes Steeper Than 3:1
- 714-R-003 Bin Type Retaining Wall
- 717-R-152 Alternates to Structural Plate Pipes
- 731-R-202 Mechanically Stabilized Earth Retaining Walls
- 913-R-403 Geogrid for Subgrade Stabilization or Modification

**For Projects that require “Removal of Buildings” Include:**

- 108-L-001 Notice to Proceed With Demolition Work
- 108-L-012 Speciality Pay Items (Pay Item: Asbestos Testing and Removal)

Note: This is only a suggested list of Recurring Special provisions. It is the Project Manager’s responsibility to compile an accurate list.

## PRESTRESSED CONCRETE I-BEAM SELECTION CHART (ENGLISH)

The attached chart for I-Beam selection is plotted for simple spans,  $f'_c = 6000$  psi (5000 psi at strand release) and uses the AASHTO LRFD code provisions. The chart gives maximum spans for each of the AASHTO sections 1 through 4, the Illinois type 4 section and the standard Indiana bulb tee sections. Typical interior beams are used, including the steel deck form weight of 15 psf, a future wearing surface of 35 psf and barrier weights of 394 lb/f. The chart is intended as a guide: Design and analysis of the chosen section should be performed to assure its adequacy.

Example: Examination of the chart reveals that an AASHTO type 3 section would have a maximum simple span length of about 77 feet when the beam spacing is 7 feet.

### CONCRETE STRENGTH

If the concrete strength is increased to 7000 psi (with 5,500 psi at strand release), the maximum spans can be increased by an average of 6%. The percentage increase varies from 4.4% to 8% depending on the section. The increase in strength allows more strand to be placed and tensioned.

For the example type 3 section, the maximum span length would be increased to approximately  $77 \times 1.06 = 81$  feet.

### CONTINUITY

Continuous spans result in smaller bending moments due to live load and continuous span dead load. This continuity effect results in an average increase in maximum (exterior) span of nearly 8%, with a range between 6% and 10% depending on the cross section. If one has a three (or more) equal span continuous bridge, the interior spans have smaller moments than the exterior spans. Due to this effect, the interior spans can be approximately 108% of the exterior span.

For the example type 3 beam, continuity would increase the maximum (end) span to approximately  $77 \times 1.08 = 83$  feet.

For a three span type 3 section, the interior span could be approximately  $83 \times 1.08 = 90$  feet, resulting in a total bridge length of  $83 + 90 + 83 = 256$  feet.

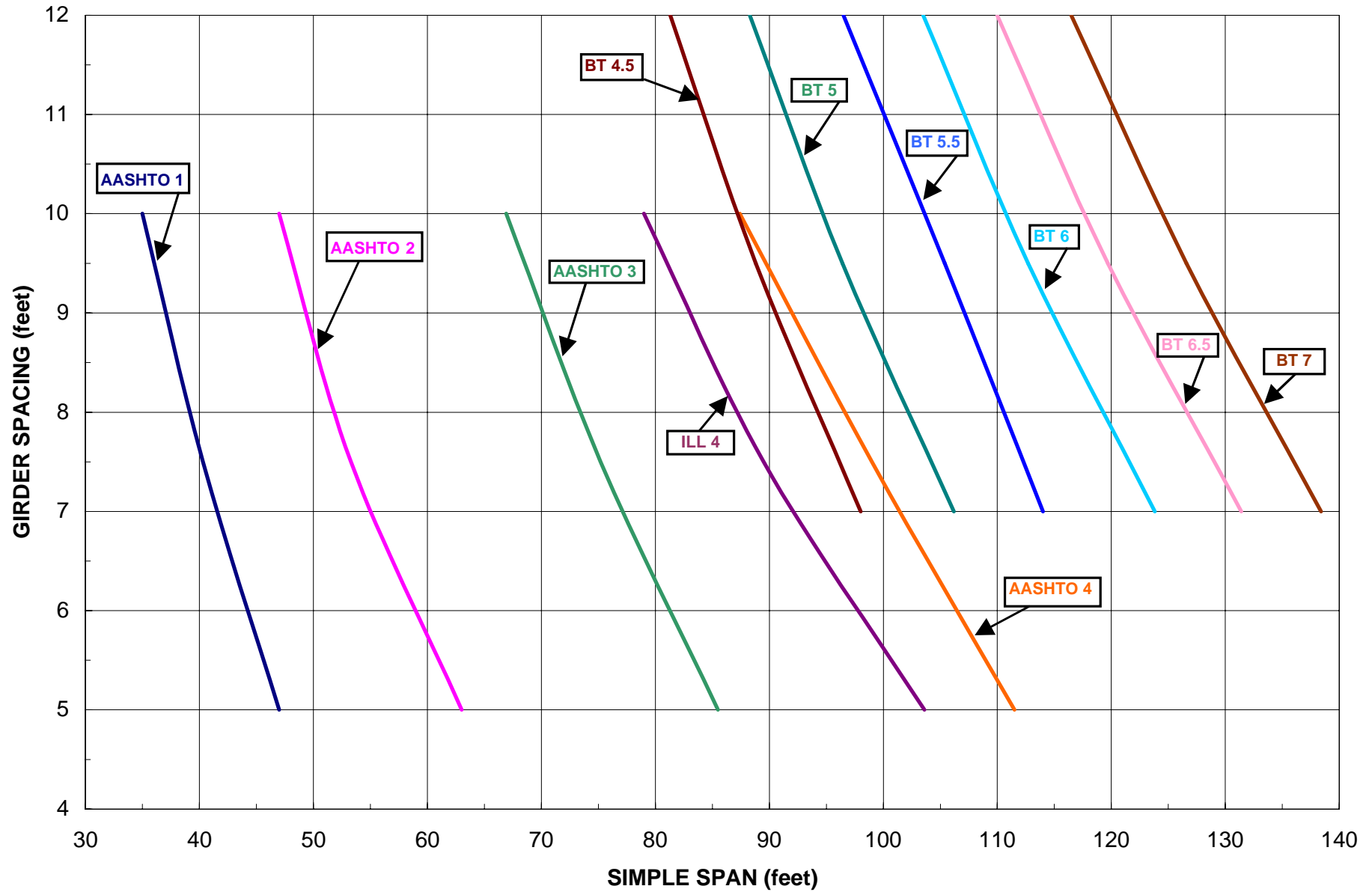
### COMBINED CONCRETE STRENGTH AND CONTINUITY

The percentages listed above may be combined for sections that have higher concrete strength and continuity. Be aware that an individual section may not be exactly at the average percentage, so the actual maximum span length may be slightly different from that predicted.

For the example type 3 beam, concrete strength of 7000 psi and continuity would increase the maximum (end) span to approximately  $77 \times 1.06 \times 1.08 = 88$  feet.

# PRESTRESSED CONCRETE I-BEAM SELECTION CHART

$f_c' = 6000 \text{ psi}$



## PRESTRESSED CONCRETE I-BEAM SELECTION CHART (Metric)

The attached chart for I-Beam selection is plotted for simple spans,  $f_c' = 41$  MPa (34 MPa at strand release) and uses the AASHTO LRFD code provisions. The chart gives maximum spans for each of the AASHTO sections 1 through 4, the Illinois type 4 section and the standard Indiana bulb tee sections. Typical interior beams are used, including the steel deck form weight of  $0.7 \text{ kN/m}^2$ , a future wearing surface of  $1.7 \text{ kN/m}^2$  and barrier weights of  $5.75 \text{ kN/m}$ . The chart is intended as a guide: Design and analysis of the chosen section should be performed to assure its adequacy.

Example: Examination of the chart reveals that an AASHTO type 3 section would have a maximum simple span length of about 24000 mm when the beam spacing is 2000 mm.

### CONCRETE STRENGTH

If the concrete strength is increased to 48 MPa (with 37.5 MPa at strand release), the maximum spans can be increased by an average of 6%. The percentage increase varies from 4.4% to 8% depending on the section. The increase in strength allows more strand to be placed and tensioned.

For the example type 3 section, the maximum span length would be increased to approximately  $24000 \times 1.06 = 25400 \text{ mm}$ .

### CONTINUITY

Continuous spans result in smaller bending moments due to live load and continuous span dead load. This continuity effect results in an average increase in maximum (exterior) span of nearly 8%, with a range between 6% and 10% depending on the cross section. If one has a three (or more) equal span continuous bridge, the interior spans have smaller moments than the exterior spans. Due to this effect, the interior spans can be approximately 108% of the exterior span.

For the example type 3 beam, continuity would increase the maximum (end) span to approximately  $24000 \times 1.08 = 26000 \text{ mm}$ .

For a three span type 3 section, the interior span could be approximately  $26000 \times 1.08 = 28000 \text{ mm}$ , resulting in a total bridge length of  $26000 + 28000 + 26000 = 80000 \text{ mm}$ .

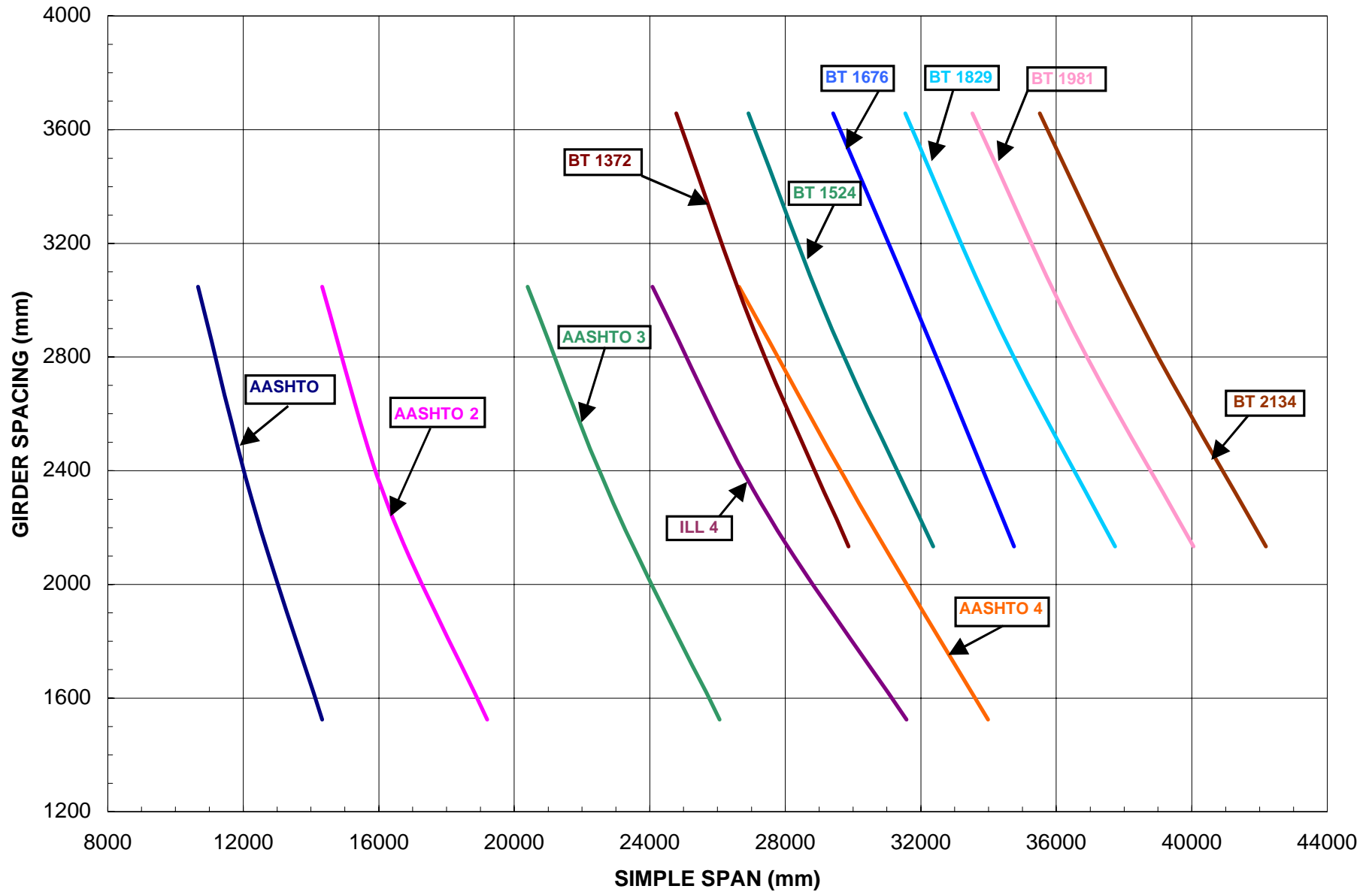
### COMBINED CONCRETE STRENGTH AND CONTINUITY

The percentages listed above may be combined for sections that have higher concrete strength and continuity. Be aware that an individual section may not be exactly at the average percentage, so the actual maximum span length may be slightly different from that predicted.

For the example type 3 beam, concrete strength of 48 MPa and continuity would increase the maximum (end) span to approximately  $24000 \times 1.06 \times 1.08 = 27500 \text{ mm}$ .

# PRESTRESSED CONCRETE I-BEAM SELECTION CHART

$f_c' = 41 \text{ MPa}$



## HMA SHOULDER CORRUGATIONS ON QC/QA PROJECTS

The Standard Specifications are revised as follows:

SECTION 401, BEGIN LINE 369, DELETE AND INSERT AS FOLLOWS:

**401.17 Shoulder Corrugations.** HMA shoulders shall have ~~formed or~~ milled corrugations, if specified in the plans.

~~(a) Formed Corrugations. Formed corrugations consist of formed depressions in newly constructed surface mixtures for shoulders. The corrugations shall be formed by means of a roller modified with a pipe welded to the drum and equipped with guides to maintain the proper offset and alignment of the strips or as approved by the Engineer. The roller shall be in accordance with 408.03(d).~~

~~(b) Milled Corrugations. Milled~~ *The corrugations consist of shall be constructed* by cutting smooth strips in existing or newly constructed shoulders. The operation shall be conducted ~~without affecting traffic operations,~~ by means of a cutting machine that provides a series of smooth cuts without tearing or snagging. The equipment shall include guides to maintain uniformity and consistency in the alignment of the strips.

SECTION 401, BEGIN LINE 590, DELETE AS FOLLOWS:

Milled shoulder corrugations will be measured by the meter (linear foot) of shoulder milled, measured parallel to the center line of the roadway. ~~Formed shoulder corrugations will not be measured.~~

SECTION 401, DELETE LINES 637 AND 638.

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## HMA SHOULDER CORRUGATIONS ON NON QC/QA PROJECTS

The Standard Specifications are revised as follows:

SECTION 402, BEGIN LINE 343, DELETE AND INSERT AS FOLLOWS:

**402.15 Shoulder Corrugations.** HMA shoulders shall have ~~formed or~~ milled corrugations, if specified in the plans.

~~(a) Formed Corrugations. Formed corrugations consist of formed depressions in newly constructed surface mixtures for shoulders. The corrugations shall be formed by a roller modified with a pipe welded to the drum and equipped with guides to maintain the proper offset and alignment of the strips or as approved by the Engineer. The roller shall meet the requirements of 408.03(d).~~

~~Density of the compacted HMA shoulders shall meet the requirements of 402.13.~~

~~(b) Milled Corrugations. Milled~~ The corrugations ~~consist of~~ shall be constructed by cutting smooth strips in existing or newly constructed shoulders. The operation shall be conducted ~~without affecting traffic operations~~ by a cutting machine that provides a series of smooth cuts without tearing or snagging. The equipment shall include guides to maintain uniformity and consistency in the alignment of the strips.

SECTION 402, BEGIN LINE 384, DELETE AS FOLLOWS:

Milled shoulder corrugations will be measured in accordance with 401.21. ~~Formed shoulder corrugations will not be measured.~~

SECTION 402, DELETE LINES 427 AND 428.

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## GEOGRID FOR SUBGRADE STABILIZATION OR MODIFICATION

The Standard Specifications are revised as follows:

SECTION 913, DELETE LINES 4197 THROUGH 4240.

SECTION 913, AFTER LINE 4241, INSERT AS FOLLOWS:

**913.21 Geogrid for Subgrade Stabilization or Modification.** *The geogrid shall be in accordance with the property requirements as follow:*

<i>PROPERTY</i>	<i>TEST METHOD</i>	<i>UNIT</i>	<i>VALUE, Min.</i>
<i>Aperture</i>	<i>Calibered</i>	<i>mm</i> <i>(in.)</i>	<i>13 x 13</i> <i>(0.5 x 0.5)</i>
<i>Open Area</i>	<i>COE CWO2215</i>	<i>percent</i>	<i>&gt;50, ≤80</i>
<i>Tensile Modulus,</i> <i>machine direction</i>	<i>GRI, GGI<sup>1, 3, 4</sup></i>	<i>N/m</i> <i>(lb/ft)</i>	<i>146,000</i> <i>(10,000)</i>
<i>cross machine</i> <i>direction</i>	<i>GRI, GGI<sup>1, 3, 4</sup></i>	<i>N/m</i> <i>(lb/ft)</i>	<i>146,000</i> <i>(10,000)</i>
<i>Ultimate Strength,</i> <i>machine direction</i>	<i>GRI GGI<sup>2, 3, 4</sup></i>	<i>N/m</i> <i>(lb/ft)</i>	<i>11,670</i> <i>(800)</i>
<i>cross machine</i> <i>direction</i>	<i>GRI GGI<sup>2, 3, 4</sup></i>	<i>N/m</i> <i>(lb/ft)</i>	<i>11,670</i> <i>(800)</i>

1. *Secant modulus at 5% elongation measured by Geosynthetic Research Institute Test Method GGI, Geogrid Tensile Strength. No offset allowance shall be made in calculating secant modulus.*
2. *Ultimate strength measured by Geosynthetic Research Institute Test Method GGI, Geogrid Tensile Strength.*
3. *Results for machine direction, MD, and cross machine direction, CMD, are required.*
4. *Minimum average roll values shall be in accordance with ASTM D 4759.*

*During all periods of shipment and storage, the geogrid shall be protected from temperatures greater than 60°C (140°F), mud, dirt, dust, and debris. The manufacturer's recommendations shall be followed with regard to protection from direct sunlight. At the time of installation, the geogrid will be rejected if it has defects, tears, punctures, flaws, deterioration, or damage incurred during manufacture, transportation, or storage. All damaged portions of geogrid for the entire width shall be replaced.*

**Indiana Department of Transportation  
Design Division - Records Unit**

**Reproduction Request**

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Please fill this form out COMPLETELY in order to get it processed properly.

DATE: \_\_\_\_\_

Requested by: \_\_\_\_\_

\_\_\_\_\_  
Contact Person

\_\_\_\_\_  
Phone No. and/or EMail Address

\_\_\_\_\_  
Name of Company

\_\_\_\_\_  
Mailing Address (number and street)

\_\_\_\_\_  
City

\_\_\_\_\_  
State

\_\_\_\_\_  
Zip

Is this request for work that is required for a State Project   YES (   )      NO (   )

If yes, please provide a Des No. and/or Contract No. for the related project.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROJECT INFORMATION:**

ROAD: \_\_\_\_\_ COUNTY \_\_\_\_\_

CONTRACT NO: \_\_\_\_\_ PROJECT NO: \_\_\_\_\_ DES. NO: \_\_\_\_\_

STRUCTURE NO: \_\_\_\_\_ SEC \_\_\_\_\_ TWP \_\_\_\_\_ RANGE \_\_\_\_\_

**Plan Size and Delivery Method**

Full Size (   )    Half Size (   )    Number of sets (   )    By Mail (   )    Pick-up (   )

**COMMENTS:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**THIS REQUEST FORM IS TO BE USED FOR FAX, MAIL AND WALK IN VISITS.**